**UNITED STATES DEPARTMENT OF COMMERCE**
**National Telecommunications and Information Administration**
Washington, D.C. 20230

January 19, 1999



Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010 - Establishment of Rules and Requirements for Priority Access Service, WT Docket No. 96-86

Dear Ms. Salas:

Enclosed please find an original and four copies of of the Comments of the National Telecommunications and Information Administration to the Commission's Third Notice of Proposed Rulemaking in the above-captioned proceeding. A copy on diskette has also been submitted to the Policy and Rules Branch, Public Safety and Private Wireless Division, Wireless Telecommunications Bureau and to the International Transcription Service, Inc.

Please direct any questions you may have regarding this filing to the undersigned. Thank you for your cooperation.

Respectfully submitted,

Kathy D. Smith
Acting Chief Counsel

Enclosures

**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**



| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| The Development of Operational, | ) | |
| Technical and Spectrum Requirements | ) | |
| For Meeting Federal, State and Local | ) | WT Docket No. 96-86 |
| Public Safety Agency Communication | ) | |
| Requirements Through the Year 2010 | ) | |
| | ) | |
| Establishment of Rules and Requirements | ) | |
| For Priority Access Service | ) | |

# COMMENTS OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

Larry Irving
Assistant Secretary for
Communications and Information

Kathy D. Smith
Acting Chief Counsel

William Hatch
Acting Associate Administrator
Office of Spectrum Management

William Speights
Public Safety Program Manager
Office of Spectrum Management

Richard Orsulak
Edward Drocella
Electronics Engineers
Office of Spectrum Management

National Telecommunications and
Information Administration
U.S. Department of Commerce
Room 4713
1401 Constitution Avenue, N.W.
Washington, D.C. 20230
(202) 482-1816

January 19, 1999

Table of Contents

## SUMMARY

The National Telecommunications and Information Administration (NTIA) applauds the Commission for taking necessary steps to satisfy public safety requirements and seek comment on important issues that will affect Federal, State and local entities alike. As discussed in these comments, NTIA remains concerned about a number of issues vital to the future of Federal, State, and local public safety cooperation and interoperability.

Because the Global Navigation Satellite System (GNSS) provides safety-of-life services, it is imperative that GNSS operations be protected from interference. The Commission must realize that the United States is making international commitments to participate in the GNSS. NTIA urges the Commission to take into account U.S. international commitments when establishing the spurious and harmonic emission limits for public safety equipment. Moreover, NTIA believes that the spurious emission limits to protect GNSS receivers and the general assumptions used to develop them would apply to any mobile transmitter or transmitters licensed under a blanket authorization.

NTIA supports the second harmonic levels established by the Commission for public safety equipment: mobile units must meet a minimum second harmonic suppression standard in the frequency range of 1559-1605 MHz of 90 dB down from the maximum effective radiated power of the carrier; and handhelds and portable units must meet a minimum second harmonic suppression standard in the frequency range of 1559-1605 MHz of 80 dB down from the maximum effective radiated power of the carrier. NTIA believes that these levels should not only apply to second harmonic emissions, but to all spurious emissions including second harmonics within the 1559-1605 MHz band.

NTIA believes that the weight, size, and cost increases that would be necessary to reduce spurious emissions (including second harmonics) in the 1559-1605 MHz band can be minimized

by operating mobile public safety equipment in the 764-776 MHz band and base station equipment in the 794-806 MHz band. Because there are fewer base stations than mobiles, it is possible to site engineer them such that they are not located in close proximity to critical approach landing areas. Furthermore, since size and weight constraints are not as much of an issue with base station equipment, it would be possible to use filters to reduce spurious emissions, including second harmonics, in the 1559-1605 MHz band. Directional antennas could also be employed at base stations to minimize interference in the direction of an airport using GNSS.

NTIA is deeply concerned over the Commission's intent to seek comment on establishing an interoperability band in the 138-144 MHz band. The Commission lacks authority to reallocate this spectrum to public safety services. NTIA has identified 3 MHz from this band that is by law intended to be auctioned through competitive bidding. Furthermore, this spectrum will not be reallocated until January 2008.

NTIA proposes that each of the 700 MHz Regional Planning Committees (RPC) include a Federal representative. NTIA proposes that the Federal Law Enforcement Wireless Users Group (FLEWUG) be given the responsibility of naming a Federal participant to each RPC. In addition, the National Coordination Committee (NCC) should also include Federal membership. Allowing Federal membership in the NCC and RPCs will encourage shared and joint-use systems and interoperability at all levels of government.

The Commission should be advised that there is a potential interference problem to the COSPAS-SARSAT downlink operations in the 1544-1545 MHz band. A 19 km coordination zone around the Local User Terminals (LUTs) for equipment whose second harmonic falls within +/- 300 kHz of 1544.5 MHz has been proposed by the National Oceanic and Atmospheric

Administration (NOAA) and the U.S. Coast Guard to mitigate interference. The Commission should consider this issue further in order to protect this critical safety-of-life service.

**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

| | | |
|---|---|---|
| In the Matter of | ) | |
| | ) | |
| The Development of Operational, | ) | |
| Technical and Spectrum Requirements | ) | |
| For Meeting Federal, State and Local | ) | WT Docket No. 96-86 |
| Public Safety Agency Communication | ) | |
| Requirements Through the Year 2010 | ) | |
| | ) | |
| Establishment of Rules and Requirements | ) | |
| For Priority Access Service | ) | |

## COMMENTS OF THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

The National Telecommunications and Information Administration (NTIA), an Executive Branch agency within the Department of Commerce, is the President's principal adviser on domestic and international telecommunications policy, including policies relating to the Nation's economic and technological advancement in telecommunications. Accordingly, NTIA makes recommendations regarding telecommunications policies and presents Executive Branch views on telecommunications matters to the Congress, the Federal Communications Commission, and the public. NTIA, through the Office of Spectrum Management, is also responsible for managing the Federal Government's use of the radio spectrum. NTIA respectfully submits the following Comments in response to the Commission's Third Notice of Proposed Rulemaking in the above-captioned proceeding.[1]

---

[1] *The Development of Operational, Technical and Spectrum Requirements For Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010 and Establishment of Rules and Requirements For Priority Access Service*, WT Docket No. 96-86, FCC 98-191 (rel. Sept. 29, 1998) (hereinafter "Third Notice").

## I. INTRODUCTION

In the past several years, the Federal, State, and local public safety communities have directed significant attention towards identifying the communications needs of these agencies, including the need for additional spectrum for growth of existing voice systems, the need for additional spectrum to accommodate emerging technology for high-speed data and imaging systems, and the persistent need for better interoperability among public safety agencies at all levels of government. The growing need for spectrum and regulatory support prompted NTIA and the Commission to charter the Public Safety Wireless Advisory Committee (PSWAC) to examine the state of public safety communications and recommend solutions to meet the needs of the public safety community. The PSWAC Final Report,[2] the first comprehensive look at public safety communications in many years, outlined the collective requirements of Federal, State, and local public safety entities in five functional areas: operational requirements, technology, interoperability, spectrum requirements, and transition/funding issues.

In response to the PSWAC Final Report, NTIA is in the process of analyzing its recommendations and developing plans to satisfy valid requirements. NTIA has taken several steps to help achieve this. In 1996, shortly after PSWAC recommendations were published, NTIA formed a Public Safety Program to address and support the Federal public safety community and their goals for an interoperable, nationwide public safety communications system. Then in 1998, Congress supported NTIA's request to expand the program through a new initiative to be implemented this fiscal year. This initiative will provide sufficient and quality

---

[2] *Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission, Reed E. Hundt, Chairman, and the National Telecommunications and Information Administration, Larry Irving, Assistant Secretary of Commerce for Communications and Information* (hereinafter "PSWAC Final Report") (Sept. 1996).

leadership, technical expertise, policy guidance and spectrum management support for the successful coordination of public safety programs within the Federal Government and the continued development of common goals (*e.g.*, interoperability) among Federal, State, and local public safety agencies.[3] Secondly, the Interdepartment Radio Advisory Committee (IRAC), which NTIA chairs, has established an Ad Hoc committee that deals specifically with public safety communications issues. This committee, called Ad Hoc 214, is tasked, among other things, with examining how to reduce regulatory barriers so that interoperability between Federal agencies and their State and local counterparts is much easier to realize. Through Ad Hoc 214, NTIA, working with the Department of Defense, initiated a landmark agreement to authorize the State of Wisconsin to use Federal radio frequencies to test a shared land mobile trunking communications system that will greatly facilitate interoperability communication during emergencies as well as during day-to-day communications. Additionally, NTIA and the FCC formed a Joint Public Safety Working Group to address the goals of interoperability and shared-use systems and also to continue the dialogue and cooperation that was formed throughout the PSWAC process.[4]

NTIA applauds the Commission for its efforts to satisfy public safety spectrum requirements. In particular, NTIA would like to commend the Commission for its decision to introduce sufficient regulatory flexibility to allow the Federal Government access, under certain conditions, to the channels in the 764-776 MHz and 794-806 MHz bands. The development of

---

[3] *See* Press Release, "Commerce Leads Effort to Advance Radio Communication Between All Levels of Government During Emergencies" (Jan. 14, 1999) (available on NTIA's World Wide Web site at http://www.ntia.doc.gov/ntiahome/press/011499publicsafety.htm).

[4] *See* Public Notice, *NTIA and FCC Announce the Formation of a Public Safety Communications Joint Working Group*, Federal Communications Commission, National Telecommunications and Information Administration (Aug. 5, 1997).

interoperable, shared, or joint-use systems is a critical element to realizing significant improvements in public safety communications.

NTIA, however, offers the following comments to specific issues raised in this Third Notice that NTIA believes will likely have a direct and significant impact upon the future needs and operations of the Federal public safety community. These comments include a detailed discussion of the potential treaty obligations regarding protection of the Global Navigation Satellite System (GNSS), Administration policy pertaining to the allocation of portions of the 138-144 MHz band, Federal agency membership on the Regional Planning Committees (RPCs) and the National Coordination Committee (NCC), and potential interference to the COSPAS-SARSAT system from equipment operating in the 764-776 MHz band.

## II. GNSS OPERATIONS MUST BE PROTECTED FROM INTERFERENCE.

The Global Navigation Satellite System (GNSS) is a satellite system which provides a world-wide position determination, time and velocity capability for multi-modal use. As currently envisioned, the GNSS will encompass aviation, maritime, and terrestrial navigation. The GNSS includes user receivers, one or more satellite constellations, augmentation systems, ground segments, and a control organization with facilities to monitor and control the world-wide conformity of the signals processed by the user receivers to predetermined operational performance standards. The U.S. Global Positioning System (GPS) and the Russian Federation Global Navigation Satellite System (GLONASS) radionavigation-satellite systems and the associated augmentation systems[5] are components of the International Civil Aviation

[5] In the United States these augmentation systems include the Local Area Augmentation System (LAAS) and the Wide Area Augmentation System (WAAS). Europe is developing the European Geostationary Navigation Overlay Service (EGNOS). Japan is developing the Multiple Signal Satellite Augmentation System (MSAS). All of these augmentation systems are capable of supporting both GPS and GLONASS signal formats. The second generation of GNSS

Organization (ICAO) GNSS. The International Maritime Organization (IMO) has also recognized GPS and GLONASS as elements of their GNSS. Both the ICAO and the IMO have identified the 1559-1610 MHz band as the sole band available to satisfy the spectrum requirements of the GNSS. The United States is a member of both the IMO and ICAO.

For civil aviation, the GNSS is planned to allow precision approach Category I, II, and III capabilities.[6] The requirements for civil aircraft operating precision approach phases of flight are defined in the ICAO GNSS Standards and Recommended Practices (SARPs). The SARPs establish the requirements necessary to protect these receivers from harmful interference.[7] Civil aviation has already employed satellite radionavigation using GPS for a range of services namely for en-route primary means and non-precision approach flight. Precision approach applications for Category I have been demonstrated and are expected to be adopted following validation of the ICAO GNSS SARPs.[8] Once approved, the SARPs represent a *treaty obligation* that is essential for international flights[9] entering the National Airspace System (NAS). In all likelihood, aircraft

---

could include other radionavigation-satellite systems such as the E-NSS-1 proposed by the European Space Agency.

[6] Category I, II, III landing conditions define the landing visibility conditions in terms of the vertical visibility ceiling and runway visual ranges. Increasing category numbers means that the visibility is decreasing.

[7] The NTIA Manual defines harmful interference as interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service. *See* National Telecommunications and Information Administration, U.S. Department of Commerce, *Manual of Regulations and Procedures for Federal Radio Frequency Management*, Sept. 1995 (revised May 1997) at page 6-7 (hereinafter "NTIA Manual").

[8] The United States has pledged its full cooperation and is working within ICAO to establish the GNSS SARPs for Category I precision approach landings.

[9] An international flight is defined as: (1) an aircraft traveling between the United States and a foreign point, or (2) an aircraft whose flight originates or terminates at a foreign point and

from other countries will be using GNSS (combined GPS and GLONASS) receivers. It would be inconsistent with the United States' treaty obligations as a member of ICAO to mandate that GPS be used exclusively by all foreign aircraft entering the NAS.

For maritime use, the GNSS will include navigation into harbor entrances and approaches and other waterways in which navigation is restricted. The GNSS, as defined by the IMO, will include the GPS and GLONASS satellite systems. As part of the GNSS for maritime use, differential GPS and GLONASS systems are also under consideration to provide localized corrections to augment the GPS and GLONASS satellite signals.[10] The requirement of GNSS for maritime navigation is contained in an amendment to the Safety of Life at Sea (SOLAS) treaty document. IMO is set to approve this amendment by the year 2000. Once approved, the United States will have to provide protection from harmful interference to GNSS receivers used on ships from other countries.

The United States is making international commitments to participate in the GNSS. This entails providing protection to the different elements of the GNSS, which include both GPS and GLONASS. The Russian Federation is implementing a three stage frequency transition plan for GLONASS. After the year 2005, the GLONASS system will be in its final configuration where its highest carrier frequency will be 1604.8125 MHz.[11] In the international frequency coordination process, the United States has committed to providing protection from interference to GLONASS in its final configuration. This protection from interference will be consistent with

---

lands at one or more points in the United States.

[10] Differential positioning is the accurate measurement of the relative positions of two receivers tracking the same GPS and GLONASS signals.

[11] The United States is encouraging the Russian Federation to expedite the completion of the GLONASS frequency transition plan by the year 2000.

standards established within the International Telecommunication Union-Radiocommunication Sector (ITU-R).[12]

NTIA urges the Commission to take into account the United States' international commitments, including the ongoing work within the ICAO and the IMO, when establishing the spurious and harmonic emission limits for public safety equipment. NTIA believes that it is in the best interest of the United States to establish a common policy on this issue in order to provide the United States with a coordinated position in the various international fora.

**A. Spurious Emission Limits Are Necessary to Protect GNSS Receivers.**

Since the GNSS signals have such a low power level at the surface of the Earth, interference, even at low levels, can degrade navigation performance. In order to ensure that the GNSS is protected adequately against interference, the Commission has proposed to adopt second harmonic suppression standards in the 1559-1605 MHz band.[13] As stated, mobile units must meet a minimum second harmonic suppression standard in the frequency range of 1559-1605 MHz of 90 dB down from the maximum effective radiated power of the carrier; and handhelds and portable units must meet a minimum second harmonic suppression standard in the frequency range of 1559-1605 MHz of 80 dB down from the maximum effective radiated power of the carrier. The second harmonic suppression limits proposed by the Commission required to protect GNSS are based on the out-of-band emission limits for mobile earth terminals operating in the Mobile Satellite Service that are necessary to protect the Radionavigation Satellite Service in the 1559-1610 MHz band. These values are consistent with the limits established by the

---

[12] Recommendation ITU-R M.1343, Essential Technical Requirements of Mobile Earth Stations for Global Non-Geostationary Mobile-Satellite Service Systems in the Bands 1-3 GHz.

[13] Third Notice, Appendix F-7, § 90.553, GNSS Protection.

RTCA,[14] the ITU-R, and the European Testing and Standards Institute (ETSI)[15] for protection of GNSS receivers. NTIA participated in the RTCA Special Committee 159 two-year study that developed the out-of-band emission limits. Moreover, NTIA agrees with the underlying assumptions used in the analysis to develop the out-of-band emission limits. This is reflected in a letter from NTIA requesting that these limits be incorporated in the Commission's licensing process and appropriate rules.[16]

The second harmonic suppression limits proposed by the Commission[17] are based on the narrow band out-of-band emission limit of -80 dBW/700 Hz. This out-of-band emission limit represents the Equivalent Isotropically Radiated Power (EIRP) density at the output of a mobile transmitting antenna. The limits on interference having bandwidths wider than 700 Hz can be derived from equations provided in Appendix G of RTCA DO-229.[18] NTIA agrees with the levels proposed by the Commission to protect GNSS, but believes that they should apply to all spurious emissions, including second harmonics within the 1559-1605 MHz band.

---

[14] RTCA/DO-235, Assessment of Radio Frequency Interference Relevant to the GNSS, January 27, 1997. RTCA, formerly known as the Radio Technical Commission for Aeronautics, is a voluntary government/industry group which performs studies and makes recommendations pertaining to radio use for aviation.

[15] European Testing and Standards Institute TBR-041, Satellite Personal Communications Networks (S-PCN); Mobile Earth Stations (MESs), Including Handheld Earth Stations, For S-PCN in the 1.6/2.4 GHz Bands Under the Mobile-Satellite Service (MSS) Terminal Essential Requirements (Feb. 1998).

[16] Letter from Richard D. Parlow, Associate Administrator, Spectrum Management to Ms. Regina M. Keeney, Chief, International Bureau, Federal Communications Commission (Sept. 18, 1997).

[17] *Supra* note 13.

[18] RTCA DO-229, Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment (Jan. 1996).

In the Third Notice, the Commission has requested comment on the validity of the assumptions that underlie the protection limits for GNSS receivers.[19] The protection limits were based on an interference mask developed for an aeronautical GNSS receiver operating in the 1559-1605 MHz band. The interference scenario used to develop the protection limits assumes that the aircraft is in the final approach phase of flight. In the final approach phase of flight, the GNSS receiver will no longer be acquiring satellites and will be in the tracking mode of operation.[20] The interfering signal is assumed to be transmitted by a mobile earth station located beneath the aircraft at a critical decision location during final approach. At this point, if interference occurs, even for a fraction of a second, false alerts could occur which cause the pilot to perform unnecessary and unacceptable evasive actions (*e.g.*, abort the landing). Annex A attached discusses the primary technical factors used in the development of the protection limits for GNSS receivers.

NTIA believes that the spurious emission limits required to protect GNSS and the general assumptions used to develop them would apply to any scenario, including a mobile transmitter or a transmitter licensed under blanket authorization -- in other words, any transmitter whose location is unknown. Moreover, NTIA does not believe that extenuating conditions such as low antenna height, propagation losses, body suppression of signals, and building attenuation are applicable in this scenario. The possibility of additional interference immunity for a GNSS receiver from spurious emissions within the 1559-1605 MHz band is technically and economically limited. Radio Frequency (RF) front-end design, meeting the requirements of the

---

[19] Third Notice at ¶ 199.

[20] The interference protection criteria for a GNSS receiver operating in acquisition mode is 6 dB more stringent when the receiver is operating in tracking mode.

ICAO SARPs, is already very difficult. A further increase in these requirements would result in limiting the reception of the upper GLONASS channels. This is not acceptable, as all of the GLONASS channels are required in the ICAO GNSS system. Therefore, NTIA supports the suppression levels proposed by the Commission to protect GNSS, but believes that they should apply to all spurious emissions, including second harmonics within the 1559-1605 MHz band.

### B. Removal of Selective Availability Will Not Change the Required Level of Spurious Emission Limits Needed to Protect GNSS Receivers.

The comments submitted by the National Public Safety Telecommunications Council (NPSTC) suggest that the removal of the Selective Availability (SA) feature of GPS would reduce the protection requirements for GNSS receivers.[21] SA operates by introducing controlled errors into the GPS satellite signals. This feature was originally designed to ensure a technological edge for U.S. military forces and will no longer be needed once new military security technologies are in place.[22] Using augmented GPS or differential GPS, many commercially available products eliminate the effects of SA. Furthermore, in the GPS Presidential Decision Directive (PDD)[23] the United States has committed to discontinue the use of the GPS SA feature within a decade (2006). NTIA does not believe that the removal of SA will change the spurious emission limits that are required to protect GNSS receivers.

---

[21] *See* NPSTC Reply Comments to the Second Notice of Proposed Rulemaking *In the Matter of The Development of Operational, Technical and Spectrum Requirements For Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010 and Establishment of Rules and Requirements For Priority Access Service*, WT Docket No. 96-86, FCC 97-373 (rel. Oct. 24, 1997) at 10.

[22] The GLONASS system does not employ the SA feature.

[23] U.S. Global Positioning System Policy Presidential Decision Directive, Office of Science and Technology Policy, National Security Council (March 1996).

### C. There are Various Ways to Reduce the Impact of the Spurious Emission Limits on the Use of the 794-806 MHz Band for the Development of Public Safety Equipment.

Many of the commenters from the public safety community have expressed concern regarding the second harmonic limits proposed by the Commission in the 1559-1605 MHz band. The commenters have stated that the second harmonic emission limits are too stringent and thus will affect the use of the 700 MHz band for the development of public safety equipment. In response to the concerns raised by the commenters, the Commission has requested information on how the second harmonic emission limits that are required to protect GNSS receivers will effect the equipment cost, size, weight, and battery life of handheld public safety equipment.[24]

Currently, the Commission has proposed to allow base station equipment to operate in the 764-776 MHz band and mobile (including handheld and portable) equipment to operate in the 794-806 MHz band. The primary concern to GNSS receivers would be spurious emissions from public safety equipment operating in the 794-806 MHz band, particularly the 794-802.5 MHz band segment. The second harmonics from equipment operating in the 794-802.5 MHz will fall within the upper portion of the 1588-1605 MHz band and in the pass band[25] of a GNSS receiver, potentially causing interference.

The concerns expressed by many of the commenters are related to the limitations the proposed second harmonic limits would place on the development of portable and handheld public safety radios. The primary concern with meeting the proposed limits would seem to be the second harmonic emissions which are difficult to control in portable and handheld equipment

---

[24] Third Notice at ¶ 200.

[25] Pass band is the band of frequencies within which the frequency of any input signal may lie without there being any significant reduction to that signal.

because of the size and weight constraints. Based on this concern, a possible solution would be to use the 794-806 MHz band for base-to-mobile communications and the 764-776 MHz band for mobile-to-base communications.[26]

Given the fact that there are fewer number of base stations, as compared to mobile stations, it is possible to site engineer them so that they are not located in close proximity to critical approach landing areas. This would reduce interference to GNSS receivers. This is not an option for handheld and portable equipment since there is no practical way to restrict their operations near airports. The task of restricting mobile operations will only become more difficult over time, since one of the main benefits of the GNSS is to eliminate expensive ground based navigation facilities and increase the availability of precision approaches using satellite navigation. This will increase the number of airports that the mobile units would have to avoid, further restricting their operations. Furthermore, since size and weight constraints are not as much of an issue with base station equipment, it would be possible to use filters to reduce spurious emissions in the 1559-1605 MHz band. Directional antennas could also be employed at base stations to minimize interference in the direction of an airport using GNSS.

NTIA realizes that the Commission's proposal allowing mobiles to operate in the 794-806 MHz band was made to address the concerns of interference from base stations to mobile public safety equipment operating in the lower portion of the adjacent 806-824 MHz public

---

[26] This concept is also supported by the Federal Law Enforcement Wireless Users Group (FLEWUG) Petition for Reconsideration and Clarification (filed Dec. 2, 1998) to the First Report and Order *In the Matter of The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communication Requirements Through the Year 2010,* WT Docket No. 96-86, FCC 98-191 (rel. Sept. 29, 1998).

safety band. However, establishing a guardband[27] between the 794-806 MHz and 806-824 MHz bands would minimize the amount of adjacent band interference. Operating mobile equipment in the 764-776 MHz band will eliminate the weight, size, and cost increases that could be necessary to reduce second harmonic emissions in the 1559-1605 MHz band. This will provide greater flexibility for mobile equipment with only minimal operational constraints on the base station equipment.

## III. THE COMMISSION LACKS AUTHORITY TO REALLOCATE THE 138-144 MHZ BAND TO PUBLIC SAFETY SERVICES.

As the Commission is well aware, the vast majority of public safety systems, both Federal and non-Federal, operate below 512 MHz. As was noted in the PSWAC Final Report, 2.5 MHz of spectrum below 512 MHz is needed to satisfy interoperability requirements between Federal, State, and local entities.[28] NTIA applauds the Commission for exploring ways to satisfy these unfulfilled requirements by providing a select number of channels in the VHF and UHF bands for this purpose[29] and supports the Commission's proposal to do so. However, NTIA emphasizes the need for Federal co-equal access to these frequencies if the objective of interoperability at all levels of government is to be achieved.

The Commission seeks comment regarding the establishment of an interoperability band in the 138-144 MHz band.[30] NTIA believes the Commission lacks the authority to reallocate the

---

[27] A guardband is a set of unused frequencies used to protect a system against interference to or from a system in the adjacent frequency spectrum.

[28] PSWAC Final Report at 3.

[29] Third Notice at ¶ 191.

[30] *Id* at ¶ 193.

138-144 MHz band to public safety services.[31] The 138-144 MHz band is currently allocated exclusively to the Government Fixed and Mobile Services on a primary basis.[32] The 138-144 MHz band is used primarily by the military services to establish communications for both tactical and non-tactical use, including tactical air-to-air and air-to-ground communications, air traffic control, non-tactical intra-base ground-to-ground communications and land mobile radio nets.

NTIA was required by the Balanced Budget Act of 1997 to identify 20 MHz of spectrum below 3 GHz for allocation and assignment by the Commission to non-Federal users through the process of competitive bidding.[33] Of the 20 MHz identified for reallocation, 3 MHz was identified from the 138-144 MHz band on a mixed-use basis: 139-140.5 MHz and 141.5-143 MHz.[34] As is noted in the Second Reallocation Report, this 3 MHz of spectrum is not planned for reallocation until January 2008.[35] Since the 139-140.5 MHz and 141.5-143 MHz bands will be reallocated on a mixed-use basis, Federal operations will be protected indefinitely at 36

---

[31] The Office of Management and Budget (OMB) also supports this position. *See* Letter from Michael Deich, Associate Director for General Government and Finance, OMB to Magalie Roman Salas, Secretary, FCC, in WT Docket 96-86 (Jan. 4, 1999).

[32] U.S. National Table of Frequency Allocation, *see* NTIA Manual Chapter 4-42.

[33] *See* Section 3002 of the Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251 (1997).

[34] National Telecommunications and Information Administration, Spectrum Reallocation Report-Response to Title III of the Balanced Budget Act of 1997, NTIA Special Publication 98-36 (Feb. 1998) (hereinafter " Second Reallocation Report").

[35] The Balanced Budget Act of 1997 requires the Commission, not later than one year after receipt of the Second Reallocation Report, to prepare, submit to the President and the Congress, and implement a plan for the immediate allocation and assignment of all frequencies identified in the Second Reallocation Report. The plan must include a schedule of allocation and assignment by September 30, 2002. *See* 47 U.S.C. § 925(c). NTIA believes the Commission's plan should be consistent with the timetable and conditions set forth in the Second Reallocation Report. *See* Second Reallocation Report at 3-11 through 3-13.

military bases.[36] Moreover, Federal operations will continue, on a primary basis, in those portions of the 138-144 MHz band (138-139 MHz, 140.5-141.5 MHz and 142-144 MHz) that have not been identified for reallocation. Under current law, those Federal operations displaced by the reallocation of the 3 MHz from the 138-144 MHz band and subsequent assignment of licenses by competitive bidding are entitled to relocation cost reimbursement from the successful auction bidders.[37]

The Communications Act of 1934 clearly delineates spectrum management authority between Federal and non-Federal usage. The 138-144 MHz band is currently allocated exclusively for Federal Government use and is not planned for reallocation until January 2008. Furthermore, the Balanced Budget Act of 1997 requires the Commission to assign licenses by competitive bidding for the spectrum identified by NTIA for reallocation under the Act. Public safety services are currently exempt from competitive bidding requirements, and therefore, a change in law would be required before the Commission could forego the requirement to assign licenses via competitive bidding.

## IV. FEDERAL PUBLIC SAFETY AGENCIES SHOULD BE REPRESENTED ON ANY REGIONAL PLANNING COMMITTEE AND ON THE NATIONAL COORDINATION COMMITTEE.

The Commission seeks comment on the use and licensing of the 8.8 MHz of spectrum held in reserve. For example, the Commission asks whether they should license the reserve spectrum pursuant to the Regional Planning Committee (RPC) process.[38]

---

[36] Protection radii range from 40 km to 125 km depending upon the location of the site to be protected. *See* Second Reallocation Report at 3-12.

[37] *See* Section 1064 of the Defense Authorization Act of 1998, Pub. L. No. 105-261 (1998)(amending Section 113 of the NTIA Organization Act, 47 U.S.C. § 923(g)).

[38] Third Notice at ¶ 169.

NTIA believes that at least one representative from the Federal Government must be included on each of the 700 MHz RPCs. NTIA submits that each RPC must have at least one Federal member with voting status. NTIA proposes that the Federal Law Enforcement Wireless Users Group (FLEWUG) be given the responsibility of naming a Federal participant to each RPC, since the FLEWUG is the entity that represents Federal public safety interests.

The Commission states that "[a] total of 2.6 MHz of the public safety spectrum in the 700 MHz band is designated in the First Report for nationwide interoperability pursuant to the guidelines to be established by the National Coordination Committee (NCC) and approved by the Commission."[39] To fully represent the public safety community, the NCC should include all levels of that community, including Federal public safety agencies. Therefore, in order to establish nationwide interoperability at all levels of government, NTIA proposes Federal membership in the NCC.[40] Federal agencies offer a unique perspective since most of their Congressionally-mandated functions require nationwide coverage. Hence, there exists the need for nationwide interoperability with State and local Governments on joint operations.

## V. AN INTERFERENCE PROBLEM MAY EXIST FROM EQUIPMENT OPERATING IN THE 764-776 MHZ BAND.

The National Oceanic and Atmospheric Administration (NOAA) operates polar orbiting and geostationary satellites that carry Search and Rescue Satellite (SARSAT) payloads that provides distress alert and location information to appropriate public safety rescue authorities for maritime, aviation, and land users in distress. Russia operates very similar instruments known as

---

[39] *Id.* at ¶ 182.

[40] The FLEWUG advocates that NTIA, PSWN and the FLEWUG be included in the NCC. *See* FLEWUG Petition for Reconsideration and Clarification to the First Report and Order, *supra* note 26.

COSPAS aboard satellites that are part of a navigation system. Both are being used in an international cooperative search and rescue effort titled COSPAS-SARSAT.

COSPAS-SARSAT consists of a network of satellites, ground stations, mission control centers, and rescue coordination centers. When an emergency beacon is activated, the signal is received by a satellite and relayed to the nearest available ground station. The ground station is called a Local User Terminal, or LUT. The LUTs receive information from the satellites in the 1544-1545 MHz band. NOAA operates fourteen LUTs in seven locations.[41] This provides total system redundancy and allows for a maximization of satellite tracking.

The Commission should be advised that there is a potential interference problem to the COSPAS-SARSAT system from the second harmonics of transmitters operating in the 764-776 MHz band. Specifically, the second harmonic of equipment operating in the 772-772.5 MHz band may directly impact COSPAS-SARSAT downlink operations in the 1544-1545 MHz band.

NTIA believes that a coordination zone is necessary to protect COSPAS-SARSAT operations from harmful interference. NOAA and the U.S. Coast Guard have indicated that mobile and fixed stations within 19 kms of an LUT, and whose second harmonic falls within +/- 300 kHz of 1544.5 MHz will require that the NCC and RPC coordinate those assignments with NOAA. Frequency coordination will greatly reduce the likelihood of interference. It is imperative the Commission consider this issue further in order to protect this critical safety-of-life service.

---

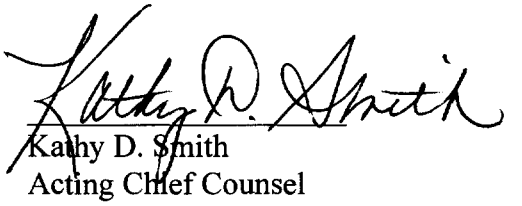
[41] Ground station locations are: Anderson AFB, Guam (latitude: 13.5784°N, longitude: 144.9390°E); Vandenberg AFB, CA (latitude: 34.6624°N, longitude:120.5514°W); Sabana Seca USN, Puerto Rico (latitude:18.4317°N, longitude: 66.1922°W); USCG Station, Wahiawa, HI (latitude: 21.5206°N, longitude: 157.9964°W); NASA JSC, Houston, TX (latitude: 29.5608°N, longitude: 95.0925°W); Fairbanks, AK (latitude: 64.9933°N, longitude: 147.5237°W); Suitland, MD (latitude: 38.8510°N, longitude: 76.9310°W).

## VI. CONCLUSION

NTIA applauds the Commission for taking necessary steps to satisfy public safety requirements and seek comment on important issues that will effect Federal, State and local entities alike. As discussed in these comments, NTIA remains concerned about a number of issues vital to the future of Federal, State, and local public safety cooperation and interoperability.

For the foregoing reasons, NTIA respectfully submits these comments.

Respectfully submitted,



Kathy D. Smith
Acting Chief Counsel

Larry Irving
Assistant Secretary for
Communications and Information

William Hatch
Acting Associate Administrator
Office of Spectrum Management

William Speights
Public Safety Program Manager
Office of Spectrum Management

Richard Orsulak
Edward Drocella
Electronics Engineers
Office of Spectrum Management

National Telecommunications and
Information Administration
U.S. Department of Commerce
Room 4713
1401 Constitution Avenue, N.W.
Washington, D.C. 20230
(202) 482-1816

January 19, 1999

## ANNEX A
## Discussion of The Technical Factors Used To Develop Protection Limits for GNSS Receivers

This annex provides a justification for the primary technical factors used in the development of the protection limits for GNSS receivers. These technical factors include: 1) interference criteria; 2) distance separation; and 3) antenna coupling.

### Interference Criteria

The interference criteria used in the development of the spurious emission limits was derived from the interference mask cited for an aeronautical GNSS receiver. The purpose of this mask is to set the minimum requirement for interference immunity. The mask is based upon what a carefully designed GNSS receiver can tolerate while still achieving the performance necessary for precision approach navigation. The interference mask requires aeronautical GNSS receivers to operate in the presence of broad-band interfering signals having an aggregate strength of -140.5 dBW/MHz in the aeronautical radionavigation service band.[1] This receiver susceptibility level is referenced to the input of the GNSS receiver and represents the interference level that manufacturers must design to while still meeting performance requirement, not the allowable level of interference. GNSS receivers are not required to function while receiving interference in excess of this mask. The allowable interference from known sources must be significantly below this value. The limits on interference having bandwidths between 700 Hz and 1 MHz can be derived from equations provided in Appendix G of RTCA DO-229.

### Distance Separation

The specification for the interference protection distance was determined by approach and landing operational requirements. Obstacle clearance surfaces and obstacle free zones in the runway are specified to ensure Category I continuity and integrity risks are satisfied. For Category I operations, the decision height (DH) is 200 feet above the surface of the runway. At this height, the DH is usually off airport property where the presence of the interfering mobile transmitter is not restricted. Category I operations define the front course obstacle clearance surface to be from 0 to 200 feet along the extended runway centerline. From 200 feet it increases at a 1:34 slope. The 200 foot DH is 3,816 feet from the runway intercept point. At this point, the 1:34 obstacle clearance surface height is 2616/34 = 77 feet, which leaves approximately 123 feet from the nominal glidepath to the obstacle clearance surface.[2] The GNSS antenna will likely be offset from about 7 to 27 feet above the nominal glidepath and the interfering signal source antenna could be located as high as the obstacle clearance surface. Thus, with the minimum Category I interference protection distance between the interfering source and the GNSS antennas of 100 feet, a 30 to 50 foot allowance remains for the aircraft Total System Error (TSE). Given that the standard deviation of the TSE of the aircraft and its navigation system is about 15 feet, then an aircraft might be below the 100 foot minimum separation distance at DH for only a

---

[1] RTCA DO-229, Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment (Jan. 1996).

[2] Glidepath is a descent profile determined for vertical guidance during a final approach.

small fraction of the approaches. With $\sigma$ = 15 feet, $2\sigma$ = 30 feet, this could occur for about 2.5% of the approaches. Thus, the aircraft will actually pass closer than 100 feet (123 - 30) on about 2.5% of approaches. The margin for this parameter cannot be reduced without the potential for interference to increase significantly.

**Antenna Coupling**

The interference scenario used in the development of the spurious emission limits assumed that the interfering signal source was located below the aircraft. RTCA DO-228 restricts the horizon gain of a GNSS antenna between -2 dBic[3] and -7.5 dBic.[4] DO-228 does not specify, however, the antenna gain below the horizon (e.g., negative elevation angles) because there is no normal signal requirements in that general direction. Negative elevation angle antenna gain is also difficult to determine and highly dependent on the specifics of aircraft installation. However, for the purpose of establishing a value for use in interference calculations, the nominal GNSS receiver antenna gain in the direction of the interfering source is assumed to be no greater than -10 dBic. This includes the effects of aircraft structural reflections and shadowing. Because of the lack of sufficient installed antenna pattern data on civil aircraft, the actual antenna gain can be higher due to the antenna pattern lobes available in the lower hemisphere.

[3] dBic is dB with respect to an isotropic circularly polarized antenna.

[4] RTCA DO-228, Minimum Operational Performance Standard (MOPS) for GNSS Airborne Antenna Equipment, RTCA Inc. (Oct. 1995).